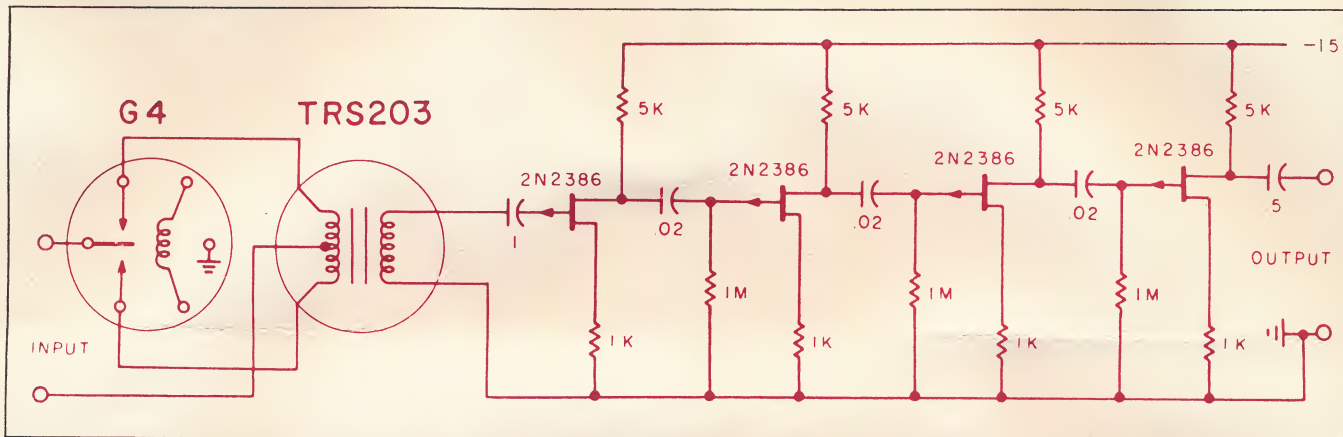


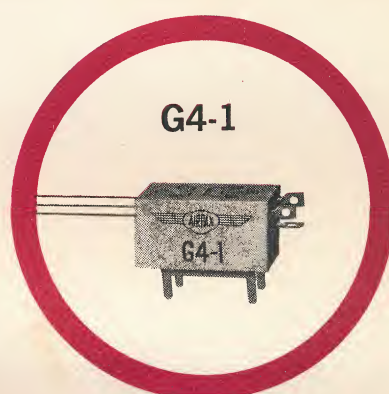
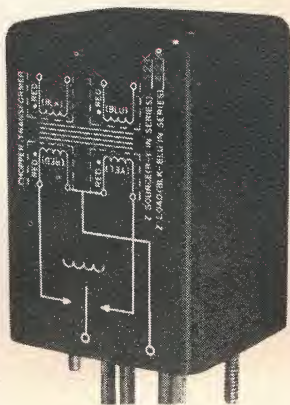
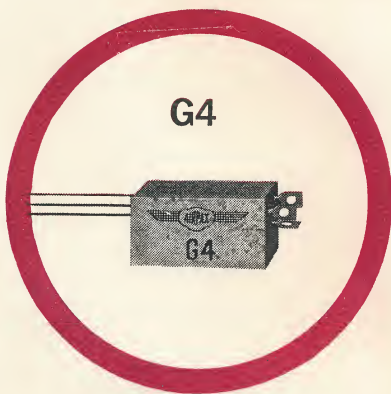
# TEN YEARS TOO LATE

Part TEN in a series on THE STATE OF THE CHOPPER ART



The FET amplifier has remarkable low noise performance. Tubes — and transistor junctions — have at least one thing in common — the noise power increases as the frequency goes down. This means a lot of jitter near DC, making readings at less than 100 nanovolts about impossible, unless the amplifier bandwidth is severely restricted. You can read 10 nanovolts with this circuit with wide band response.

## THE VERY REMARKABLE G4 MECHANICAL CHOPPER – BORN 10 YEARS TOO LATE



## TRANSFORMERS DON'T SEEM TO GET ANY SMALLER

Boy oh boy. If only we had this thing 10 years ago when mechanical choppers were real fashionable. It would have made all those nasty competitors look sick. (Sigh!)

We don't really expect you to care much about a mechanical chopper nowadays. Even if the offset is below 50 nanovolts, even if it buzzes away docilely at most any frequency up to some 1500 cycles. Even when it's almost transistor size. (You can get by without the input transformer — we're just trying to sell you that too. Profit is our motive.)

Could be, of course, you haven't time to horse around — you need something working the first time. Or you'll sacrifice reliability — 25,000 hours life is good enough. You might like the bifurcated contacts isolated completely from contamination. Try one. This G4 chopper is practically perfect.

We maybe ought to ignore the low cost, it not being Solid State. The G4 is a lot smaller and lighter than a solid state chopper. Honest. Just add up the contrivances you need for solid state drive.

It sure would have been nice 10 years ago.

**AIRPAX ELECTRONICS** incorporated Cambridge Division, Cambridge, Maryland



## SPECIFICATION

## G 4 SERIES

AIRPAX GENERAL SPECIFICATION GS-1 FORMS A PART OF THIS DRAWING

## A. CONTACTS :

1. SPDT BBM
2. POLARITY—WITH POSITIVE VOLTAGE ON LEAD 4 AND NEGATIVE ON LEAD 5, LEADS 1 AND 3 CLOSE.
3. VOLTAGE AND CURRENT RATINGS—20 VOLT, 1 MA. RESISTIVE.
4. CAPACITANCE—CONTACTS TO GROUND  $5\mu\text{F}$  MAX.

B. COIL DATA AT  $25^{\circ}\text{C}$  :

1. VOLTAGE, RATED— $6.3\text{ VRMS} \pm 0.6\text{ VRMS}$ .
2. POWER CONSUMPTION—200 MW MAX.
3. SATISFACTORY OPERATION—0 TO 1500 Hz.

C. OUTPUT CHARACTERISTICS AT 6.3 V RMS,  $25^{\circ}\text{C}$ 

1. TRANSFER TIME— $5^{\circ}\text{ MIN}$ .
2. DWELL TIME— $165^{\circ} \pm 10^{\circ}$ ,  $165^{\circ} \pm 15^{\circ}$  AT  $-65^{\circ}\text{C}$  TO  $+125^{\circ}\text{C}$ .
3. DISSYMMETRY— $10^{\circ}\text{ MAX}$ .
4. CONTRIBUTIVE NOISE— $1\mu\text{VOLT}$  AT 1 MEGOHM MAX.
5. BOUNCE— $2^{\circ}\text{ MAX}$ . DURING FIRST  $5^{\circ}$  OF EACH DWELL
6. LIFE—2500 HOURS MIN.
7. OFFSET—750 NANOVOLTS AT 1 MEGOHM IMPEDANCE.

## D. ENVIRONMENTAL CONDITIONS.

1. VIBRATION—OPERATING MIL STD 202 B METHOD 204 A, CONDITION B. 10 TO 55 Hz, 0.06 INCH DISPLACEMENT. 55 TO 2000 Hz, 15 G.
2. SHOCK—OPERATING 100 G PER MIL STD 202 B METHOD 202 A, CONTACT DERANGEMENT  $10^{\circ}\text{ MAX}$ .
3. TEMPERATURE RANGE—OPERATE  $-65^{\circ}\text{C}$  TO  $+125^{\circ}\text{C}$ .
4. INSULATION RESISTANCE—10 K MEGOHMS MIN. AT 100 VDC, ALL PINS TO CASE.
5. DIELECTRIC STRENGTH—145 V RMS, 400 Hz OR 200 VDC FOR 60 SECONDS. ALL INSULATED PINS TO CASE

## E. MECHANICAL CHARACTERISTICS

1. WEIGHT—7.1 GRAMS

## F. ORDERING INFORMATION

1. SPECIFY OPERATING FREQUENCY BY ADDING FREQUENCY IN HERTZ TO PART NUMBER. EXAMPLE G4-60 = 60 Hz
2. SPECIFY MOUNTING BY CHANGING LAST DIGIT IN PART NUMBER TO CORRESPOND WITH DESIRED MOUNTING CONFIGURATION. EXAMPLE G4-64 = 60 Hz, AXIAL MOUNT. CONFIGURATION NO. 0 WILL BE SUPPLIED UNLESS OTHERWISE SPECIFIED.

G 4 —	60 Hz			400 Hz		
RESISTANCE DC	$300\Omega \pm 10\%$			$100\Omega \pm 10\%$		
RESISTANCE AC	$315\Omega \pm 20\%$			$155\Omega \pm 20\%$		
IMPEDANCE	$320\Omega \pm 20\%$			$175\Omega \pm 20\%$		
INDUCTANCE	$100\text{MH} \pm 25\%$			$30\text{MH} \pm 25\%$		
PHASE ANGLE	$40^{\circ} \pm 10^{\circ}$			$75^{\circ} \pm 15^{\circ}$		

AIRPAX ELECTRONICS INC.



CAMBRIDGE

MARYLAND

TITLE CHOPPER, SUB MICRO

DRAWN HC *McN*

MATERIAL

CHECKED *hwm*

FINISH FLAT GREEN

APPROVED *BL*TOLERANCES (FRACTIONAL  $\pm 1/64$  DECIMAL  $\pm .005$ ) UNLESS NOTED

DATE 12-10-65

G 4-SERIES

SCALE 3/1

ASS'Y. C-278

REVISION C



6355

A 6393

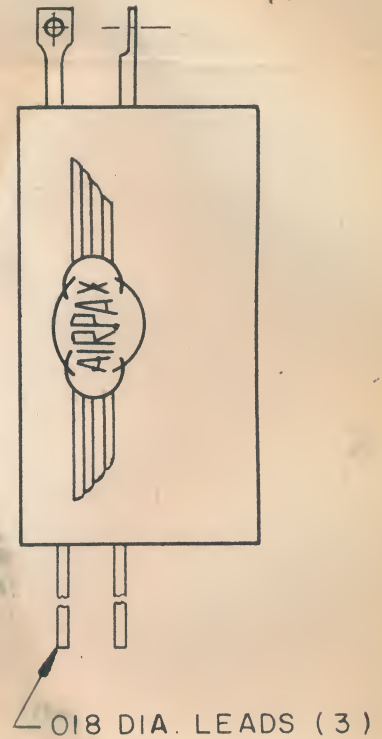
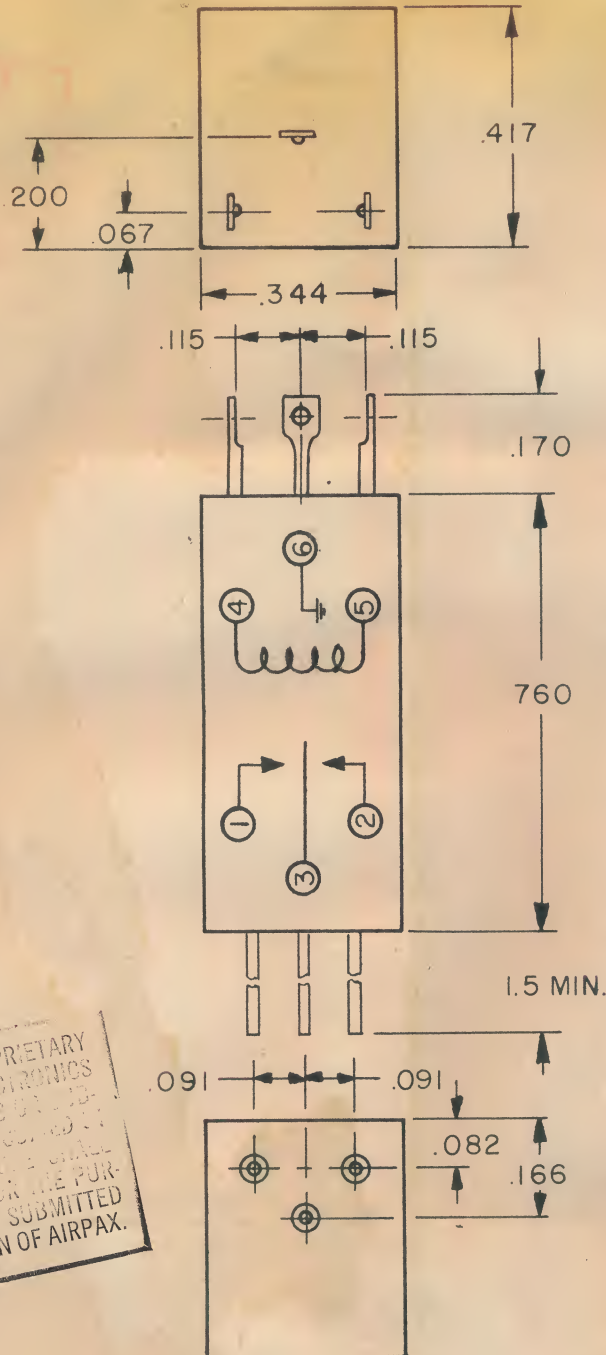
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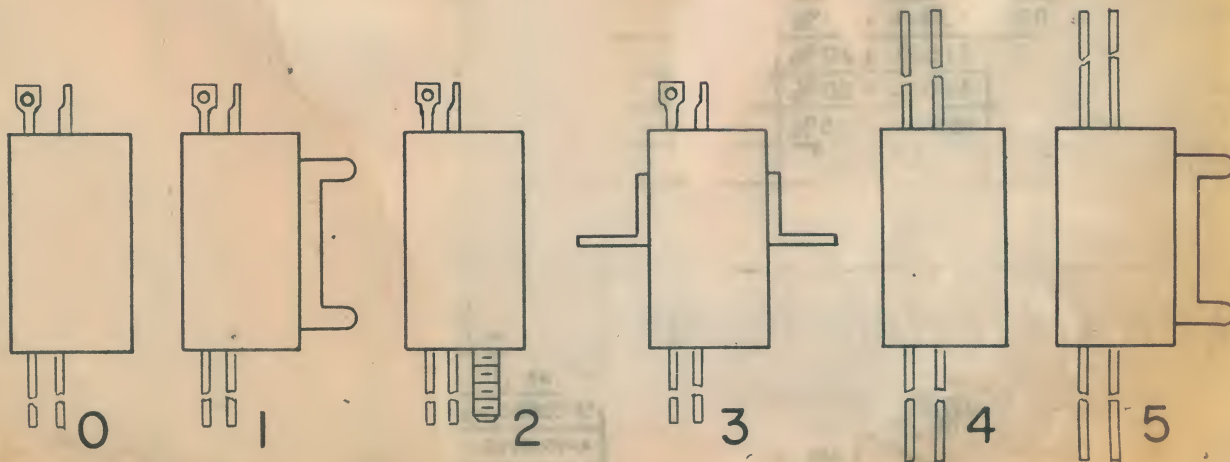
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C 6528

See chg. no.  
HC 5-11-66



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MOUNTING CONFIGURATION (SCALE 3/2)



CAMBRIDGE DIVISION, Cambridge, Maryland 21613

Phone (301) 228-4600 TWX: CAMB. MD. 301-228-3558

October 12, 1966.

Mr. T. Nelson  
Box 1546  
Poughkeepsie, New York 12603

Reference: The G4 Chopper

Dear Mr. Nelson,

Thank you for your request for information on the referenced chopper.

The G-4 chopper has the following distinct characteristics that set it above other chopper types.

1. Extremely small size
2. Long Life
3. Low contributive noise and offset
4. High shock
5. High vibration
6. Excellent contact action  
(multi-element precious metal contacts)
7. Coil to contact isolation (physical and electrical)

Enclosed is an outline drawing and specification for the G-4 chopper. May we assist in the application of this unit to your requirement?

Very truly yours,

AIRPAX ELECTRONICS INCORPORATED

Bill Kouzoulas  
Director of Sales

/lmw

Enclosures